university of toronto
computing services

UTCS ComputerNews

IT'S TIME

SITE LICENCES

TO RENEW!

Also Inside

Novell NetWare

PC Security Devices

Distributed Computing

Maple Corner

ISSN 0315-4661 July/August 1992 No. 279

Contents

News

Good News for Site Licence Owners 1
Statistical Software Licences 2
Follow-up to Changes to WordPerfect Site Licence Eligibility Requirements 4
Changes in the UTCS Computer Course Fee Structure 5

Features

Get Well-Connected with Novell NetWare 6
Securing Your Personal Computer Part 1 — Physical Security Devices 11
INTERNET Notes 15

Numerical and Scientific Software

IMSL Product Licence Reminder 22
Distributed Computing and Load Sharing 22
Maple Corner: News for Maple Users at U of T 24

Departments

UTCS Services 26
Consulting & Enquiries 27
UTCS Directory 27
Terminal and Advising Sites 28
UTCS Site Licences 29
PC Maintenance 34
UTCS Software List 35

Publisher
University of Toronto Computing Services
Toronto, Ontario
Canada M5S 1C1

Editor: Patricia Hood

Editorial Assistant: Maureen Monné

Publication Date: *August 1, 1992*

Subscriptions
Subscriptions run for one year, beginning each January. Changes should be entered on the form at the back of this issue and mailed to: *ComputerNews*, 4 Bancroft Avenue, Room 217 (or phone 416-978-4034). FAX: (416)978-7159.

ComputerNews is published eight times yearly by the University of Toronto Computing Services (UTCS). Enquiries should be directed to:

The Editor
ComputerNews
University of Toronto Computing Services
4 Bancroft Avenue, Room 217
Toronto, Ontario
Canada M5S 1A1

Network address:
phood@vm.utcs.utoronto.ca
(NetNorth/BITNET/EARN)

Unless otherwise indicated, network addresses appearing after the author's name pertain to NetNorth/BITNET/EARN.

Permission is granted to reprint articles from *ComputerNews* for noncommercial purposes provided the author, publication, and issue are acknowledged.

IBM PC, PC-XT, PC-AT, Personal System/2, Operating System/2 are trademarks of IBM.
Intel is a registered trademark of Intel Corporation.
LaserWriter is a registered trademark of Apple Computer, Inc.
Lotus 1-2-3 is a registered trademark of Lotus Corporation.
Macintosh 512K, Plus, SE are trademarks of Apple Computer, Inc.
Microsoft Word and Microsoft Windows are trademarks of Microsoft Corporation.
MultiFinder is a trademark of Apple Computer, Inc.
Paintbrush is a trademark of Microsoft Corporation.
PostScript is a registered trademark of Adobe Systems Inc.
SAS is a trademark of SAS Institute Inc., Cary, N.C.
SPSS^x is a trademark of SPSS Inc.
UNIX is a trademark of AT & T Laboratories.

Acknowledgements
Thanks to Elizabeth Rayson for her assistance in editing this issue.

This newsletter was entirely produced on a Macintosh using PageMaker and other related Macintosh software.

Good News for Site Licence Owners

Patricia Hood
phood@vm.utcs.utoronto.ca

Site licence owners have scored a small victory in the battle against rising costs and reduced budgets. UTCS site licence prices for most licences will remain the same as last year! There have been three increases only. Novell licences have increased slightly due to fluctuations in the US exchange rate. The SAS/PC IML module has increased in price because low demand over the past two years required that we reduce the number of units we license. An increase in the SYSTAT yearly site licensing fee, as well as the addition of SYSTAT for DOS, has caused an increase in the SYSTAT price. The price list, effective July 1, 1992, is printed below. (SPSS prices will be announced closer to the licence end date of October 31, 1992.)

SAS, SYSTAT, and WATFOR-77 users who are required to renew their licences after July 1 should have received new registration forms in the mail already. SPSS users will receive renewal information closer to their renewal date of November 1, 1992. If you are considering purchasing an IMSL licence, please note that our licence agreement ends September 3, after which we will not be able to sell these licences.

While site licence technical changes are profiled in more detail throughout this issue, I'd like to summarize them here. SAS/UNIX Sun-3 and Sun-4 customers who renew will receive the complete suite of components (eleven products instead of the previous five) because of a new licensing policy from SAS. SYSTAT MAC users may upgrade to version 5.2 (if they have appropriate hardware) and anyone* may purchase the new SYSTAT for DOS that we have added to our site licence. New SYSTAT 5.2 documentation is available as well. Further information about registration forms and renewals can be obtained from Evelyn Ward at the UTCS Information Office, 978-4990.

*Faculty, staff, and graduate students.

C++	$42.00
Chaos I	$12.00
QuickMail	$35.00
QuickMail upgrade	$17.00
UNIX	$18.00
WordPerfect New	$42.00
WordPerfect Upgrade	$7.00
SAS/PC	$35.00
SAS/PC IML	$31.00
SAS/PC ETS	$31.00
SAS/PC Network	$17.00
SAS/PC IML Network	$16.00
SAS/PC ETS Network	$16.00
SAS/UNIX Sun-3 (Full)	$388.00
SAS/UNIX Sun-4 (Full)	$388.00
SPSS/PC	$40.00[1]
SPSS/PC network	$20.00[1]
SYSTAT/Mac/DOS	$80.00
SYSTAT network	$40.00
WATFOR-77	$40.00
IMSL upfront cost	$588.00[2]
IMSL/PC	$195.00[2]
IMSL/A Fortran	$935.00[2]
IMSL/A Graphics	$475.00[2]
IMSL/A C Base	$445.00[2]
IMSL/A Inter Doc. Fac.	$140.00[2]
IMSL/A Install	$140.00[2]
IMSL/ B Fortran	$565.00[2]
IMSL/ B Graphics	$285.00[2]
IMSL/ B C Base	$265.00[2]
IMSL/ B C Inter. Doc. Fac.	$87.00[2]
IMSL/ B Install	$87.00[2]
Novell 100 new	$4,873.00[3]
Novell 100 upgrade	$2,088.00[3]
Novell 20 new	$2,506.00[3]
Novell 20 upgrade	$1,392.00[3]
Novell 100 trade-in	$3,480.00[3]
Novell 20 trade-in	$2,088.00[3]
Novell Mac	$438.00[3]
Novell NFS	$1,392.00[3]
Maple-DEC2100	$300.00
Maple-DEC5000	$500.00
Maple-DEC5400	$760.00
Maple-HP9000/300	$300.00
Maple-HP9000/700	$430.00
Maple-RS6000/320	$300.00
Maple-Macintosh	$130.00
Maple-MIP RC3230	$300.00
Maple-Sun-3	$240.00
Maple-Sun-4	$300.00
Maple-SGI/IRIS	$300.00
Maple-SGI/IRIS 50-80	$500.00
Maple-SGI/IRIS 120-240	$760.00
Maple-PC	$200.00

[1] Until October 31, 1992

[2] Note: The IMSL licence agreement ends September 3, 1992. No licences will be sold after that date.

[3] Note: These prices have risen due to fluctuations in the US exchange rate.

Statistical Software Licences

Sandra Gardner
sgardner@vm.utcs.utoronto.ca

General News

This is the time of year that the SAS (PC and UNIX) and SYSTAT (Macintosh) licences are renewed. (SPSS/PC+ licences are renewed in November.) If you have not received your renewal package in the mail, please contact the Information Office at 978-4990. The July 1, 1992 site licence prices are summarized in *Table 1*. Please note that there is a new SYSTAT for DOS licence (see details below). For details about software changes and enhancements for existing site licences, see the appropriate section below.

A few users have expressed an interest in obtaining a site licence for SAS for OS/2, SAS for Windows (when the product is released), SPSS for OS/2, or SPSS for Windows (a new product). I have been investigating the feasibility of obtaining these licences but I have nothing to announce at this time. As soon as a decision has been made about which site licences UTCS will offer, and the necessary administrative support has been arranged, the user communities will be notified about hardware and software requirements, the licence fees, procedures for converting from a PC/DOS site licence, and technical support issues.

SAS/PC

There are no changes or enhancements to the SAS under PC/DOS site licence; i.e., there are no new modules or procedures to add to your existing installation(s).

SAS/UNIX

There are no changes or enhancements for SAS release 6.03 software (Sun-3 and Sun-4).

For Sun-3 and Sun-4, SAS Institute now bundles all available SAS release 6.07 modules under one site licence fee. (Release 6.07 requires SunOS 4.1.) *Tables 2* and *3* describe which modules have been previously available, which modules have been added, and the amount of disk space that is required. You may install as many modules as you want. Please call the Information Office at 978-4990 to arrange to borrow the cartridge tapes needed to upgrade your software and to order manuals.

SYSTAT 5.2 for Macintosh

Users of SYSTAT 5.1 for Macintosh may upgrade their software to SYSTAT 5.2. If you choose to upgrade, I highly recommend that you purchase the new manual set. The following quote from *The SYSTAT Network Newsletter* (Vol., No. 1, Winter 1992, page 2) de-

Table 1

Site Licence	**Regular Price**	**Network Price***
SAS/PC:		
Basic Package (base, STAT, Graph, FSP)	$35.00	$17.00
Additional Modules:		
IML	$31.00	$16.00
ETS	$31.00	$16.00
SAS UNIX (Sun-3, Sun-4):		
Complete package (all modules)	$388.00	n/a
SYSTAT 5.2 Macintosh	$80.00	$40.00
SYSTAT 5.0 DOS	$80.00	$40.00

* minimum three machines.

Table 2

Sun3: Module	**Disk Space (in MB)**	**Size of Optional Samples (in MB)**
Base SAS *	17.8	1.5
SAS/AF	0.5	0.02
SAS/ASSIST	10.6	
SAS/CONNECT	0.4	0.02
SAS/ETS	2.7	0.2
SAS/FSP*	0.6	0.1
SAS/GRAPH*	7.8	0.8
SAS/GRAPH map data sets*	36.6/11.8**	
SAS/IML*	2.0	0.4
SAS/INSIGHT	2.0	
SAS/OR	5.6	0.4
SAS/QC	10.0	0.6
SAS/STAT*	6.0	0.7

* Previously licensed module. ** Compressed.

scribes the major enhancements to the SYSTAT software:

"SYSTAT 5.2 offers significant improvements over version 5.1, in both speed of processing and responsiveness of the user interface. Menu choices are refined for faster analysis of complex data sets, with fewer clicks of the mouse. The software continues to offer a broad range of statistical analyses, including the most complete implementation of the general linear model yet available on the Macintosh. Major statistical improvements include repeated measures analysis, handling of categorical data, hypothesis testing, and means model coding. (The means model is useful for designs that have missing cells, or have cells with unequal n values that reflect population differences.) Stepwise regression output now has options for forward, backward and interactive model building."

"Additional hypothesis tests include a method for arbitrary contrasts of effects or means, and new post hoc methods: Scheffé, one- and two-sided Dunnett, Bonferroni, Fisher's LSD, and Tukey-Kramer. Version 5.2 also calculates Greenhouse/Geyser and Huynh-Feldt p values."

SYSTAT 5.2 also takes advantage of Apple's new QuickTime software and is System 7 compatible. SYSTAT 5.2 requires a Macintosh (with or without a math coprocessor) with a minimum of two megabytes (MB) of Random Access Memory (RAM), System 6.0.2 or higher, and 4.5MB of hard disk space.

To upgrade your SYSTAT software or install SYSTAT on a new computer, please bring three formatted double density diskettes to the Information Office at 4 Bancroft Ave., Room 201.

(See the new Installation Service below.)

Network SYSTAT 5.1.1 for Macintosh

At the time of writing, Network SYSTAT 5.1.1 was still the current version for Macintosh networks. SYSTAT, Inc. is planning to release Network SYSTAT 5.2 soon. Licencees will be eligible to upgrade when the software becomes available. Please call the Information Office at 978-4990 for upgrade procedures. You must renew your network licences for the 1992/93 contract year to receive the upgrade.

SYSTAT 5.0 for DOS

I would like to announce the new SYSTAT for DOS site licence. This licence was acquired because it is easier to learn and use than SAS/PC or SPSS/PC+, especially for people who need only occasional access to a statistical package. The annual fee is $80 per machine and the complete manual set can be purchased for an additional $58. (See *Table 1* for Network pricing.) SYSTAT for DOS users are encouraged to call the SYSTAT technical support line if they need assistance using the software. No courses will be offered by UTCS.

SYSTAT for DOS is menu driven, easy to use, and has minimal hardware requirements (approximately 7MB of hard disk space and 640 kilobytes of RAM). A math coprocessor is recommended but not required. The site licence includes SYGRAPH, the graphics module, along with the statistical modules which perform simple descriptive statistics, crosstabs, nonparametric statistics, correlations, linear and nonlinear regression, ANOVA, ANCOVA, MANOVA, repeated measures, discriminant analysis, principal components, multidimensional scaling, cluster analysis, and time series analysis. A program (MACPC) is provided to translate SYSTAT system files to and from MAC and IBM format. SYSTAT can also import dBASE files and Lotus spreadsheets, which will aid in the transfer of data between SYSTAT, SAS/PC, and SPSS/PC+.

If you would like to acquire a SYSTAT for DOS licence, please call the Information Office at 978-4990 to obtain the registration contract and to arrange to borrow the diskettes for installation (see new Installation Service described below).

SYSNET

SYSTAT, Inc. sends UTCS multiple copies of their newsletter *SYSNET, The SYSTAT Network* which covers Macintosh and DOS topics. The latest volume is available at the Information Office.

Table 3

Sun4: Module	**Disk Space (in MB)**	**Size of Optional Samples (in MB)**
Base SAS *	21.8	1.5
SAS/AF	0.5	0.02
SAS/ASSIST	10.5	
SAS/CONNECT	0.4	0.02
SAS/EST	3.0	0.2
SAS/FSP*	0.7	0.1
SAS/GRAPH*	7.9	0.8
SAS/GRAPH map data sets*	37.4/12.0**	
SAS/IML	1.6	0.4
SAS/INSIGHT	1.9	
SAS/OR	5.7	0.3
SAS/QC	9.5	0.6
SAS/STAT	7.0	0.7

* Previously licensed module. ** Compressed.

Installation Service

Starting in September, 1992, UTCS will be offering an installation service for our PC/DOS and Macintosh licences on the University of Toronto campuses. The fee is $60 per hour (length of time required depends on the site licence). Travel time to the Scarborough and Erindale campuses will be charged as well. The installation service will be coordinated through the Information Office at 978-4990. When a request for installation service is received by the Information Office, a meeting time and place will be arranged for the installation of software.

If you have any questions or you would like to see a demonstration of any of the products, please call Sandra Gardner at 978-5128.

Follow-up to Changes to WordPerfect Site Licence Eligibility Requirements

Patricia Hood
phood@vm.utcs.utoronto.ca

In the May/June issue of *ComputerNews* I announced that WordPerfect Corporation was formulating a new policy pertaining to the relationship between universities and hospitals in Canada. The official policy is now in place, allowing hospitals greater freedom in negotiating their own licensing agreements directly with WPCorp in Utah. WordPerfect felt the policy was necessary because some hospitals were abusing the School Software Licensing Program.

The official policy as it pertains to the University of Toronto is much the same as the temporary policy stated last month. Hospital offices and classrooms used exclusively for educational purposes by University of Toronto employees and students qualify as part of the University of Toronto campus and are eligible for the current School Software Licensing Program administered by UTCS. Under the policy, offices used for private practices do not qualify. The software cannot be used by persons who are not current employees or students of the University of Toronto. (While a cross-appointed researcher may qualify, his or her hospital-employed administration staff would not.)

In summary, the conditions of use for all WordPerfect 5.1 licences administered by UTCS are:

1. The licences must be purchased by University of Toronto employees.
2. The software must be used on the University of Toronto campus by current employees and students of the University of Toronto.
3. The software remains the property of the University of Toronto, and reverts to it should the purchaser leave the employ of the University.
4. A separate licence must be purchased for each machine on which WordPerfect is installed.

Changes in the UTCS Computer Course Fee Structure

Irene Rosiecki
rosiecki@vm.utcs.utoronto.ca

A part of UTCS' mandate is to offer computer training in selected computer applications to University of Toronto faculty, staff, and graduate students. These computer applications are ones that are supported by the Computing and Communications Division at the University of Toronto.

Beginning with September courses, UTCS will increase fees. The new schedule of course fees appears below.

New courses are being added as well. The courses listed at the bottom of the table will be available in the near future.

All courses are offered on an ongoing basis. Please call Irene Rosiecki, Education Coordinator, at 978-4565 for course dates, times, and registration information.

Existing Courses	New Fee	Course Duration
Introduction to dBASE IV	$200.00	15 hours
Introduction to DOS	$135.00	10 hours
Introduction to Excel on the Macintosh	$200.00	15 hours
Introduction to FoxBASE+/Mac	$200.00	15 hours
HyperCard Seminar	$80.00	6 hours
Introduction to Lotus 1-2-3	$200.00	15 hours
Introduction to PageMaker 4.0	$160.00	12 hours
Introduction to SAS on the PC	$135.00	10 hours
Intermediate SAS-Data Processing	$200.00	15 hours
Intermediate SAS-Statistics	$200.00	15 hours
SAS/GRAPH Seminar	$55.00	4 hours
Introduction to Microsoft Word on the Macintosh	$160.00	12 hours
Introduction to WordPerfect 5.1	$160.00	12 hours
Advanced WordPerfect 5.1	$135.00	10 hours

New Courses	Fee	Course Duration
Introduction to the Macintosh	$55.00	4 hours
Introduction to Microsoft Word on the PC	$160.00	12 hours
Introduction to the PC	$40.00	3 hours
Managing Your Hard Disk	$55.00	4 hours

Get Well-Connected with Novell NetWare

David Sutherland
davids@gpu.utcs.utoronto.ca

NetWare began as a collection of computer programs that allowed MS-DOS computers to share a common hard disk and printer. Today, this functionality has been extended to enable Macintosh, OS/2, MS-DOS and UNIX-based computers to share common disks and printers. In addition, more recently developed NetWare products allow the sharing of modems, remote access to MS-DOS application programs, connectivity to various mainframe and mini-computer environments, as well as the use of distributed database applications.

What are the Benefits of a Network?

The primary reason to install a network is to provide network users with capabilities not available to users of standalone computers. Typical goals for installing a network in the workplace are listed below.

Shared Information

Sharing information is an important part of many jobs. A network makes it possible to share information without physically moving it using floppy diskettes or paper. In addition, a network makes it possible to create new types of activities, whereby many people can work with the same information at the same time. Two examples of these new types of activities are distributed database use, and electronic mail and conferencing.

Reduced Operational Costs

Many tasks (such as installing new versions of software) can be done once, to benefit all the people on the network. This reduces the amount of time spent going from machine to machine. A network's ability to centralize many basic computer "housekeeping" functions makes it easier to maintain computers on a network. Two important housekeeping items are backup and security.

Backup. The average personal computer does not come with any features that encourage regular backups, and most departments cannot afford to install a high speed tape drive on every computer. Locating files on a network server simplifies the backup process. One individual in a department can have the responsibility of backing up the network, rather than relying on each individual to do the job themselves. Many backup utilities can be programmed to automatically do the backups during off-hours, so that there is minimal need for human intervention.

Security. A typical personal computer in an office or undergraduate lab is very accessible. There are few mechanisms to prevent an unauthorized individual from using the machine, making a copy of the software on the machine, or reading or damaging files that might be stored on it. Networks generally provide the tools to control and monitor the use of the facilities on the network.

Reduced Capital Costs

The section in this article titled *Network Versus Non-Networked Budget* shows that reduced capital costs are not necessarily the greatest benefit resulting from using a Novell network. Falling prices of hard disks have narrowed the cost advantages of shared hard disks over individual ones. The total per-machine cost of a network connection can be as much as, or more than, the cost of a medium-sized hard disk.

Still, when a hard disk is shared, individual requirements for storage space are reduced. For example, a single copy of WordPerfect requires about four megabytes (MB) of disk space. On a network, this single copy would be shared by many people. By contrast, an office or lab that has ten individual computers would require almost 40MB of disk space (10 x 4MB) to store the multiple copies of WordPerfect.

Networks also allow users to share printers. Unlike hard disks, high-quality laser printers are still relatively expensive, particularly when you consider the small amount of time an individual uses the printer. A network allows many people to use a single printer, thus maximizing efficiency.

The most impressive advantage of Novell networks, however, is their ability to make the task of communicating within the University much more straightforward.

Assuming that his or her department has purchased the appropriate software and has the appropriate connectors, a University employee whose personal computer is linked to a Novell network no longer needs to use a modem, a terminal, or a leased communication line to connect to the University's administrative mainframe. This can reduce the amount of money spent on leased communications lines, modems, and terminals throughout the University as a whole.

Problems with Networks

Sharing a computer network is just like sharing a house—it depends on cooperation, common interest, and compatibility to be successful. In order for the network to be successful, it must meet the needs of the people who will use it.

Sharing a printer in an office is a good case in point. It is common to change between letterhead, legal, and letter size papers during the course of a day. When a printer is directly connected to a computer, this task is as easy as changing the paper tray, and has little impact other people's work. When network printing is introduced into an office, it must be configured so that selecting paper types is a simple operation, and so that performing the operation does not interfere with other users' work.

Networks also increase the complexity of the existing computer environment, since additional network hardware and software need to be installed and maintained. User accounts need to be created, and passwords and security controls need to be defined and maintained. The installation and configuration of the network versions of standard software (e.g., WordPerfect) require much more technical background than the comparable non-network installation.

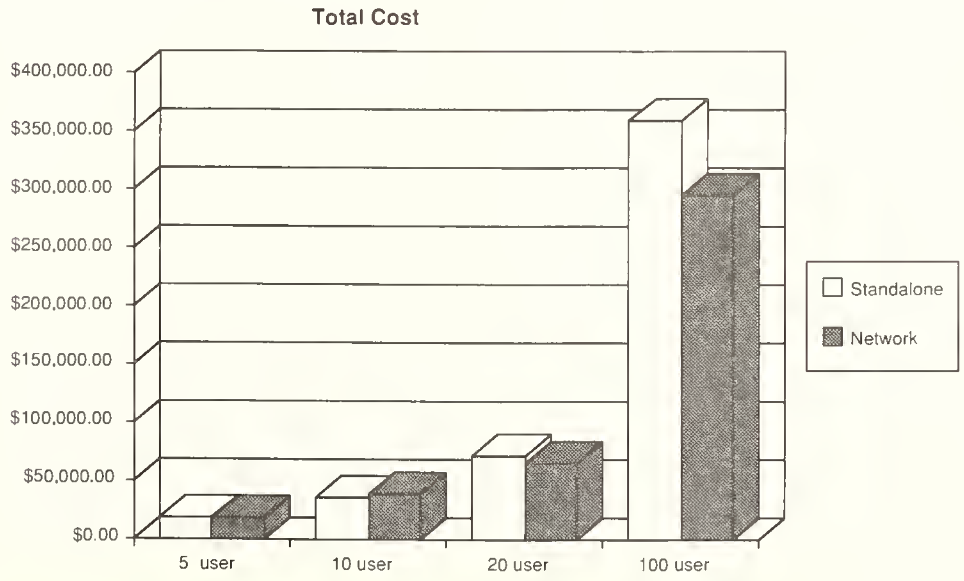
Network Versus Non-Network Budget

This section describes a sample Novell NetWare installation, and compares it to a non-networked system in terms of total cost and cost per workstation.

Basic Assumptions

We have chosen equipment that has the resources to support existing MS-DOS software. The equipment is also suitable for Graphical User Interface (GUI)-based applications, like those running under Windows or OS/2. No doubt some people will object that our choices exceed their requirements, and others may point out that we should have selected more powerful equipment. However, the goal of this budget exercise is to create a model which allows us to understand the effect that a network can have on an information technology budget. No effort has been made to optimize either the standalone or network configurations (i.e., to account for individual price and quality variations in equipment). While such an effort would be necessary for a "real world" installation, it only complicates our attempt to compare equivalent equipment in this case.

Figure 1: Network installations are less expensive than large standalone installations.



Workstation Assumptions

The basic workstation uses a 33 megahertz (MHz) 80386 with 4MB of random access memory (RAM), with ample expansion capabilities for additional memory, adapter boards, and drives.

The standalone units are equipped with 100MB drives in order to support the additional storage requirements of a GUI-based operating system, and to provide adequate storage for the individual data files. Each standalone unit also has its own tape backup device and laser printer.

The network units are equipped with 50MB drives in order to provide local disk space for a GUI-based operating system. All applications software and user data will be stored on the fileserver. Printing and backup services will also be provided via the network.

Fileserver Assumptions

For the 100-user network, we selected an IBM PS/2 Model 95, and added a one gigabyte hard disk. For both the ten- and the twenty-user networks, we selected an IBM PS/2 Model 80 with a 310MB hard disk. Both these computers offer considerable expansion capabilities, making it easy to add additional storage capacity, memory, and high performance network interface cards as they are needed. For the five-user network, we have selected a standard 33MHz 80386 compatible computer that uses an IDE drive and ISA adapter cards.

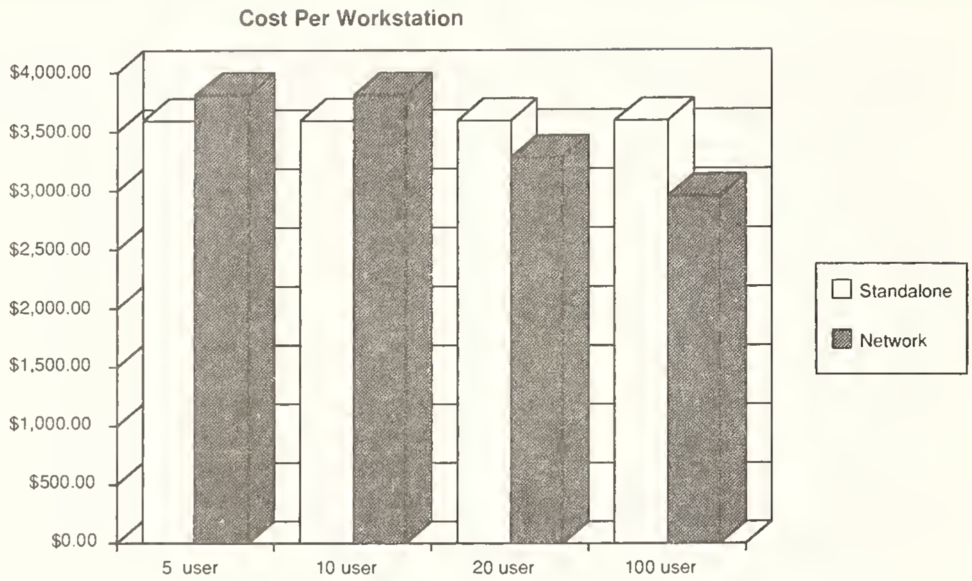


Figure 2: The "per workstation" cost of the network installation ranges from a high of $4,000 for the five-user network to a low of $2,800 for the 100-user network.

The "Total Cost" chart (*Figure 1,* previous page) shows that large network installations are less expensive than large standalone installations. However, if you need a smaller number of computers (i.e., for networks of five, ten, or twenty users), networks are more expensive to install than standalone computers. It also shows that large installations are expensive—period.

Many departments in the University are not large enough to make a network installation more cost-efficient than a standalone installation, and it is often hard to argue in favour of the intangible benefits of networks—such as improved security, backup, and communication—in the face of shrinking budgets.

The "per-workstation" cost of the network installation ranges from a high of $4,000 for the five-user network to a low of $2,800 for the 100-user network. The standalone cost remains constant, regardless of how many machines are being used. These figures suggest that in order to achieve any significant reductions in the University's capital expenditures on personal computers, it is necessary that smaller groups (e.g., two or three departments) cooperate in establishing shared computing facilities.

Elements of a NetWare Network

The two basic elements of a Novell network are the software and the hardware. The type of software the computer is running determines whether it is a fileserver or a workstation. Network cables and the network interface card (NIC) make up the hardware element. Because the range of network-related issues is so varied, it is important to have someone involved in the network design who can see the whole picture. Technical decisions need to be made concerning the type of cable used, and how the information is to be transmitted on the cable. Issues related to the user's view of the network, such as the structure of the file system, the installation of the software, and configuration of the user accounts, also need to be decided.

The major hardware components of a network (cables, NICs, computers, and controllers) are shown in *Figure 3.*

The Workstation

Some trickery is needed to enable an MS-DOS computer to communicate with a Novell fileserver. The trick is accomplished using two programs, NETX and IPX. Each program has a specific role. *Figure 4* (page 10) describes the process in detail, and the example below should help you understand it better.

For example, you want to open a WordPerfect file on your workstation, which is connected via a Novell network to a fileserver elsewhere in your department. With WordPerfect running on your machine, you would ask WordPerfect to load the file "letter.txt". NETX intercepts the command from WordPerfect and determines whether "letter.txt" is located on a local disk or a network disk. If it is on a network disk, NETX translates the command in to a format that the fileserver can understand, and passes the command to the IPX program. IPX prepares the command for transmission on the network. The fileserver then sends the desired information back to your workstation (again using a format that IPX and NETX can understand). WordPerfect is unaware that it is receiving information from the fileserver, and not from the workstation's own hard disk.

In this way, NETX is able to make it appear that there are hard disks available on the workstation when these disks are, in fact, located on a fileserver's hard disk.

The Fileserver

Novell calls their product a "Network Operating System". This means that when the NetWare software is installed on a computer, it provides its own facilities for controlling the disk drives, communicating with the network, and operating the keyboard and screen. As a result, MS-DOS applications programs—

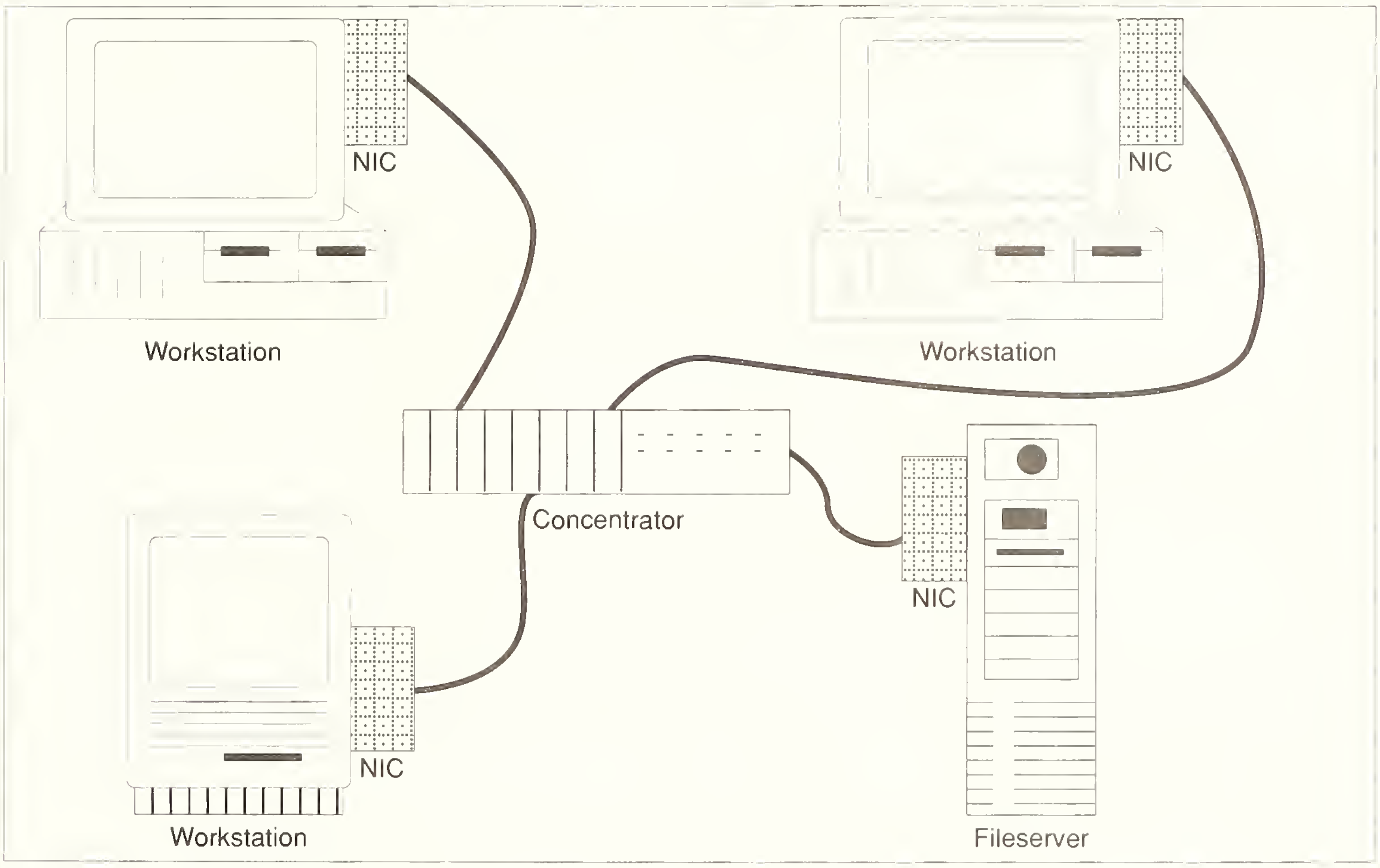


Figure 3: Hardware components of a network

like spreadsheets and word processors—will not work on the fileserver.

This confuses many people, since one of the main reasons to install a fileserver is to allow many people to use a word processor or spreadsheet that runs on MS-DOS. The reason for this apparent inconsistency is that while the applications programs may be stored on the fileserver, they are actually used (or run) on the individual workstations.

Novell currently offers three basic configurations of NetWare.

Version	**Description**
NetWare Lite	single user
NetWare 2.2	5-user, 10-user, 50-user and 100-user versions
NetWare 3.11	5-user, 10-user, 20-user, 50-user, 100-user, 250-user versions

UTCS has a university-wide site licence that allows us to distribute NetWare 3.11. The licence fee is $2,506 for the 20-user version and $4,873 for the 100-user version.

If you would like more information about NetWare, please call David Sutherland at 978-5426, or send electronic mail to *davids@gpu.utcs.utoronto.ca.*

Getting Help with Novell Networks at UTCS

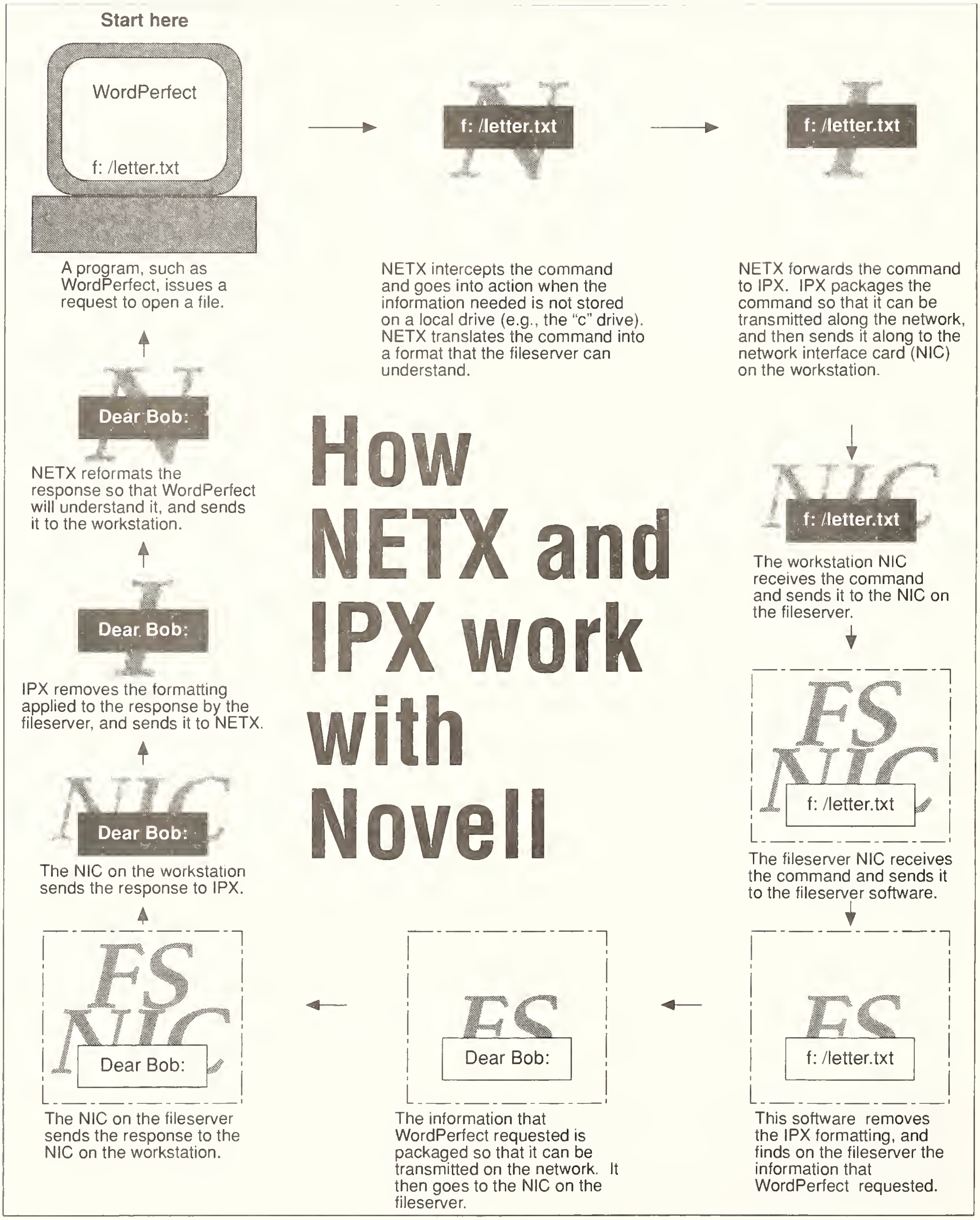
If you are interested in how a Novell network might help you in your line of work, there are consultants available at UTCS to help you.

If you are interested in setting up networks for research purposes (i.e., in research laboratories across campus), contact Terry Sanderson at 978-4597.

If you are interested in setting up a teaching laboratory, contact John Bradley at 978-3995. He can help you define and understand your needs and set up your network. You will also receive help training your staff to administer the network.

In addition to using networks in laboratories, you may also want to set up a network in your office. Contact Alex Nishri at 978-7109 to help you define your needs and plan your office systems network.

For registration forms and pricing information for Novell site licences, contact Evelyn Ward at the UTCS Information Office, 978-4990.



How NETX and IPX work with Novell

A program, such as WordPerfect, issues a request to open a file.

NETX intercepts the command and goes into action when the information needed is not stored on a local drive (e.g., the "c" drive). NETX translates the command into a format that the fileserver can understand.

NETX forwards the command to IPX. IPX packages the command so that it can be transmitted along the network, and then sends it along to the network interface card (NIC) on the workstation.

The workstation NIC receives the command and sends it to the NIC on the fileserver.

The fileserver NIC receives the command and sends it to the fileserver software.

This software removes the IPX formatting, and finds on the fileserver the information that WordPerfect requested.

The information that WordPerfect requested is packaged so that it can be transmitted on the network. It then goes to the NIC on the fileserver.

The NIC on the fileserver sends the response to the NIC on the workstation.

The NIC on the workstation sends the response to IPX.

IPX removes the formatting applied to the response by the fileserver, and sends it to NETX.

NETX reformats the response so that WordPerfect will understand it, and sends it to the workstation.

Figure 4

Securing Your Personal Computer

Part I—Physical Security Devices

Wilfred L. Camilleri
sdsawlc@mvsb.utcs.utoronto.ca

The physical loss of a personal computer is costly, but the loss of computing power and the data stored on the computer can be disastrous and expensive to replace. Personal computers are easy targets for those determined to steal or damage them. As well, the proliferation of personal computers has caused a decentralization of control. Once kept in secure data centres, computers are now scattered on desktops, waiting to be stolen.

Those responsible for the security of personal computers are faced with the daunting task of protecting their computers from theft, illegal access, and malicious acts that result in unauthorized use and damage of the equipment. Sensitive or confidential information is vulnerable to unauthorized access without the proper security. If a thief or a disgruntled employee walks away with your computer, the monetary loss may seem minimal compared to the loss of the information stored on the hard drive. Personal computers can also be rendered useless through the theft of critical components, such as circuit boards and communications boards.

Several products are now available to prevent equipment and information loss. Some are expensive, but a few are relatively inexpensive. The equipment you need to secure your personal computer depends on your environment and what the computer is used for. In this article, we will explore physical devices that prevent the theft or intentional destruction of the equipment. In the Part Two of the article (in a future issue of *ComputerNews*), we will explore ways to protect the data on your computer.

Since space is limited, it is impossible to list all the devices and products that are currently available on the market; therefore, only one or two examples will be given in most categories. If you require assistance in deciding what is best for your environment, please contact me (manager of Computer Security Administration at University of Toronto Systems Development) at 978-1267.

The following paragraphs describe ways to secure your equipment using physical security devices, including locks, cabinets, cables, alarms, and deterrent products such as warning labels and marking of equipment. Each type of device is discussed separately.

Locks

Apart from the locks that most personal computers come equipped with, there are other locks that can be used to prevent unauthorized access to or removal of the equipment. These use either adhesive-mounted pads or metal brackets to fasten the computer and other equipment to a desk or tabletop. These devices are usually manufactured out of hardened steel. Some use special adhesives, while others use bolts. Generally speaking, most of these devices are secure against forces of up to 6,000 pounds.

Keylocks that provide extra security are also in this category. Keylock devices allow the user to easily remove the equipment by unlocking it from its anchoring device. Some examples follow.

PC Guardian. This vendor offers a number of physical security devices. A Power Switch Lock controls access by securing the on/off switch of IBM PS/2s. A Floppy Drive Lock prevents the removal or insertion of unauthorized diskettes from IBM PS/2s. This locking device can also be combined with cabling and anchoring devices to prevent unauthorized removal of the equipment.

PC-Lok. PC-Lok is a device that secures your PC's on/off switch and backplate, keeping boards and data safe from unauthorized access. This locking device can also be combined with cabling and anchoring devices to prevent unauthorized removal of the equipment.

KB-Lok. This is a locking device that enables you to lock the keyboard so no one can access your data. It also includes an additional lock to secure the PC's chassis and the internal boards.

Cabinets

Cabinets are used to enclose the entire computer, including peripheral equipment such as printers. These cabinets are usually constructed of metal or composite materials, making

For previous articles on security issues see the following ComputerNews issues: No. 272, July/August 1991, p. 24., "Information Security at the University of Toronto"; No. 274, November/December 1991, p. 21, "Protecting Your PC or Mac Against Computer Viruses"; No. 275, January/February 1992, p. 8, "All About Passwords"; No. 276, March 1992, p. 16, "Office Security"; and No. 277, April 1992, p. 5, "LAN Security".

them difficult to break into. Some examples follow.

Inmac SR. Cabinet. This cabinet locks up the entire PC, including the monitor, keyboard, printer, and CPU. The cabinet offers six shelves and a pull-out keyboard shelf. The cabinet is equipped with casters for easy mobility.

Inmac JR. Cabinet. This cabinet is designed to secure your PC's CPU and keyboard. The cabinet offers five shelves including a pull-out keyboard shelf. The cabinet is equipped with casters for easy mobility.

Inmac PC Centre. The PC Centre is similar to the SR. Cabinet but offers more features and is of steel construction instead of particle board construction. It includes a height-adjustable keyboard shelf with side extensions for paper documents and mouse operation. The cabinet also has a shelf for storage of binders, manuals, and other supplies. The cabinet is equipped with casters for easy mobility.

Mac-Safe. This product secures the Apple Macintosh in a compact cabinet enclosure. The cabinet allows for keyboard and mouse storage.

Cables

Cables are probably the most common security devices, and usually the cheapest. They also tend to be the most flexible for preventing theft. Usually, steel cables are placed through metal rings that are attached to the equipment and a desk or table. Although cables prevent an individual from quickly walking away with a piece of equipment, they can be cut. However, they cannot be cut with ordinary tools. Some examples follow.

PC Guardian Cabling Systems. This cabling system can be used to secure PC's, peripherals, video and lab equipment and Macintoshes to a desk or table. Fittings attach to the equipment using existing screws, slots, or a special super-strength adhesive. The security cable is secured to the desk or table, threaded through the fittings on the equipment, and locked using a padlock.

Personal computers are easy targets for those determined to steal or damage them.

Inmac Universal Lok. This cabling system also makes use of existing screws in the back of equipment or adhesive-backed pads. All kinds of equipment can be secured by this system, including printers, monitors, modems, scanners, lab equipment, video equipment, and facsimile (FAX) machines.

Alarms

Alarms do not prevent the theft of equipment. They either act as a deterrent, or function to alert people in the vicinity that a device has been removed from its usual location. Alarms can be installed inside or outside the equipment. These devices usually emit loud, piercing sounds if the equipment is moved or if the alarm is tampered with. Some alarms are equipped with keys to enable authorized personnel to deactivate them. Some examples follow.

Spider. This device is a battery-operated alarm system. It uses pressure-sensitive adhesive pads for desk and tabletop office equipment. It allows for movement of equipment within a ten foot diameter of the workstation.

Fly. The Fly is for portable computers. It is a motion-sensitive electronic alarm which is activated with a key and sounds up to six hours if the equipment is moved.

Protech. This is an internally mounted alarm system that sounds a loud alarm when a microcomputer is moved without authorization. It includes cover interlocks, which prevent theft of internal components.

Electronic Theft Protector. This device is attached to the equipment and will emit an alarm if its power pack is unplugged, if the cable is cut, if the device is detached from the equipment, or if the box is tampered with. It can be placed on the outside or inside of the equipment to be protected.

One specialized security measure that UTCC has recommended for unattended student computer labs is a combination cabling, alarm, and alarm monitoring service. When a cable is cut, an alarm sounds and the monitoring service automatically contacts the police.

Keylock Devices

These devices are used to control access to a computer's on/off switch and disk drives. They also control access to the boards inside the computer cabinet. An example is the *ACCO Keyboard Lock-out Kit*. This kit enables you to lock the circuit boards, secure the power switch, and electronically control the keyboard. When the keyboard is activated by turning on a switch, an electronic barrier is placed between the keyboard and the CPU that stops the transmission of commands. This kit can also be used in conjunction with ACCO security cables and plates.

Miscellaneous Devices

Anchor Pad Products. Anchor Pad International markets products that enable you to anchor devices to desks and table tops. These products use high-strength adhesive pads. Other products from this company include locks for disk drives.

Card Access Control Devices. These products are high-end protection devices. Card access systems employ magnetic stripe cards, smart cards, and Key Disks to control access to computers. For example, the *PC3 Security System* allows you to control access to individual computers by requiring authorized users to use an access card or a KeyDisk (a KeyDisk is a diskette which acts as a key to unlock the computer).

Deterrent Products

Apart from the alarms discussed earlier, other deterrent products include warning labels and equipment marking devices such as engravers, special pens, and chemical marking. Two examples are given below.

Operation Provident. The University of Toronto Police, in cooperation with the Metropolitan Toronto Police, offers a program that facilitates the identification of lost and stolen property. To take part in the program, you must engrave an identification number (provided by the organizers of Operation Provident) onto your equipment. Joining the program is free; your only cost will be that of an engraver, available from most hardware stores for approximately twenty-five dollars. Stickers announcing that the protected equipment has been marked are available from the Campus Police.

Ion-II. Ion-II is a product which enables you to mark your equipment with a "Chemical Fingerprint". The Chemical Fingerprint is unique to each organization. A tiny chemical dot identifies a marked item, and once the chemical is applied, it cannot be removed. It penetrates beneath the surface, leaving traces even if the visible part is removed. The system works on any surface except glass and diamonds. The chemical can also be applied to individual parts inside your equipment. The chemical can be sprayed, dabbed, or painted on. Warning stickers which can be customized and used for inventory identification purposes are also available.

The equipment you need to secure your personal computer depends on your environment, and what the computer is used for.

Media Safes and Cabinets

Many users of personal computers assume that by storing diskettes in a desk or a filing cabinet, they are protecting them from loss due to fire, heat, water, and other dangers—a very erroneous assumption. Even rooms constructed out of concrete cannot adequately fulfill the specifications for the storage of magnetic media. Diskettes are very sensitive to temperature extremes, dust, humidity, magnetism, and smoke particles. The only way to protect magnetic media against data loss due to these factors is to store them in specially designed media cabinets or safes. Some examples follow.

Hadak Safes, Cabinets, and Media Drawers. These cabinets are designed specifically to protect magnetic media against the effects of fire. They are available in various shapes, sizes, and finishes, and come with a choice of locks, including adjustable key locks or combination locks. They provide system-adapted interior fittings, with fixed or pull-out shelves, pull-out hanging frames, lockers, and drawers. Diskette cabinets can also be used for filing cassette tapes, microfilm and other heat sensitive media made of various plastic materials. The smallest cabinet is called "The Drawer". It measures 292 mm by 363 mm by 595 mm, and can store up to 130 5.25-inch or 129 3.5-inch floppy diskettes. It can also be used to store backup streamer tapes. The Drawer has a UL72 Class 125 rating (or a two-hour fire rating). This means that its contents are protected from high temperatures like those produced by a fire for two hours.

Schwab Mixed Media Files and Media Safes. The mixed media files look like normal vertical and lateral filing cabinets. The only difference is that they are constructed to protect media from fire, magnetic interference, and everyday accidents. The storage capacity ranges from 213 3.5-inch diskettes to 180 5.25-inch diskettes. The Media Safe's capacity ranges from 425 to 1,680 5.25-inch diskettes, and from 600 to 2,640 3.5-inch diskettes.

Other Ways to Secure Your Equipment

There are other considerations you should make when determining how best to protect your computer. Static electricity (quite common in modern buildings) can cause loss of data, damaging of delicate electronic parts installed inside the computer cabinet, and malfunctioning of the computer. A simple stroll across a carpet can produce up to 30,000 volts of static! To combat this, you can use antistatic mats. *Inmac Antistatic Chair Mats,* which come in various colours and finishes, are placed on the floor behind your desk or workstation. The mats stop static from being transmitted to your computer and other equipment.

Inmac Zap Guard Antistatic Mats are smaller mats which sit under your equipment. A simple touch of the carbon mat drains static from your body before you touch your equipment. These are more reliable and less expensive than floor mats. Floor mats cannot drain static when you are wearing rubber-soled shoes.

Power surges, brownouts, spikes, and power outages can result in loss of data, destruction of equipment, and much frustration. Devices specially designed to protect electronic equipment against power fluctuations (such as power bars) are inexpensive, easy to use, and a good investment. Power bars should be monitored regularly to ensure they are providing the needed protection. A bar that has absorbed one high voltage hit may not be able to absorb another. UPS (Uninterruptable Power Supply) devices can be used in critical applications to prevent sudden loss of power. Some examples are listed below.

Proxima Surge Suppresser Strips. These are power bars that provide protection against electrical surges.

SurgeMaster. These devices provide 3-stage protection, including unwanted signals or "noise" on your power lines, electrical power surges, and overload protection through circuit breakers.

American Power Conversion (APS) Uninterrupted Power Supply Units. These devices come in various sizes and ratings. Depending on the model, UPS units allow for an orderly shutdown or continued operation during a power outage. Available backup time ranges from as little as 16 minutes up to 320 minutes. These units also protect your equipment from line noise, spikes, sags, brownouts, and blackouts.

Another consideration for the security-conscious computer user is the location of the equipment within the office environment. For example, Local Area Network (LAN) servers should be set up in a locked room, where access is limited to the LAN administrator and his or her backup. If your computer is attached to a network with access to a mainframe computer, care should be taken to ensure that only authorized individuals have access to the computer or the workstation. Users should also be required to log off once they are finished using the computer or workstation.

Finally, some users are unaware that the coffee or pop they enjoy while working at their computer may cause a lot of damage to the equipment and diskettes if they happen to spill it. You should be careful not to spill any liquids on computer equipment or magnetic media.

Security is Everyone's Business

Security is everyone's business. As a computer user, you should be aware of your responsibilities regarding the protection of your equipment, and of the information stored on it. As well, you should know how to effectively safeguard the magnetic media (such as diskettes and tapes) that you use on that equipment.

Beware....be aware!

Wilfred Camilleri is the Manager, Computer Security Administration, at University of Toronto Systems Development

Microcomputer Short Courses

Irene Rosiecki
rosiecki@vm.utcs.utoronto.ca

UTCS offers various noncredit microcomputer courses to faculty, staff, and graduate students of the University of Toronto. These courses cover a number of software programs available for the PC or the Macintosh. Whether you will be typing a thesis on a word processor, or working with spreadsheets, databases, or desktop publishing, we may be able to help you get started.

Our class sizes are small to allow for much individual attention. In most cases, continuing support is available upon completion of a course.

The following is a list of the microcomputer courses taught at UTCS:

- Introduction to dBASE IV
- Introduction to Disk Operating System (DOS)
- Electronic Mail Seminar
- Introduction to Microsoft Excel on the Macintosh
- Introduction to FoxBASE+/Mac 2.0
- HyperCard Seminar
- Introduction to Lotus 1-2-3
- Introduction to PageMaker
- ProComm Communications Seminar
- Introduction to SAS on the PC
- Intermediate SAS - Data Processing
- Intermediate SAS - Statistics
- SAS/Graph Seminar
- Introduction to Microsoft Word on the Macintosh
- Introduction to WordPerfect 5.1
- Advanced WordPerfect 5.1 Topics

To find out about course dates and registration procedures, or to book a place in any of these courses, please contact Irene Rosiecki at 978-4565. Courses are filled on a first-come, first-served basis. The more popular courses fill up quickly, but waiting lists are maintained in case of cancellations.

INTERNET NOTES

Herb Kugel
herb@gpu.utcs.utoronto.ca

Information for INTERNET Beginners

In this issue of *ComputerNews*, we present two new publications for Introduction to the INTERNET. Each has different material, and each can be helpful. There is also new material in each that has not appeared before.

In future columns, we will define user applications that might be helpful to specific areas of the user community and, also, tools available to aid the INTERNET user working from a PC.

"Questions and Answers for the New INTERNET User" — Update

The popular INTERNET guide, "Questions and Answers for the New Internet User", has been updated. This publication is a must for anyone who uses the INTERNET. Possibly the best way to describe it is to repeat the announcement about it and then illustrate how to obtain it:

```
A new For Your Information (FYI) Request for Comments is now available in online RFC
libraries.
FYI 4:
RFC 1325:
Title:       FYI on Questions and Answers
             Answers to Commonly asked "New Internet User" Questions
Author:      G. Malkin & A. Marine
Mailbox:     gmalkin@xylogics.com, april@nisc.sri.com
Pages:       42
Characters:  91,884
Obsoletes:   RFC 1206
This FYI RFC is one of two FYI's called, "Questions and Answers" (Q/A), produced by the User
Services Working Group of the Internet Engineering Task Force (IETF).  The goal is to
document the most commonly asked questions and answers in the Internet.
In addition to updating information contained in the previous version of this FYI RFC, the
following new questions have been added:
Questions About the Internet:
   How do I get a list of all the hosts on the Internet?

Questions About Internet Documentation:
   What is the RFC-INFO service?
   What is an FYI?
   What is an STD?
   What is the Internet Monthly Report?

Questions About Internet Organizations:
   What is the Internet Society?
```

INTERNET NOTES

Questions About Internet Services:
  What is "archie"?
  How do I Connect to archie?

Mailing Lists and Sending Mail
  How Do I Send Mail to Other Networks?

This guide contains a broad spectrum of information about other areas in the INTERNET. Users familiar with File Transfer Protocol (FTP) should engage in the following dialog. Text that you are to type is preceded by a pointing hand (☛).

```
gpu.utcs%                                   ☛ ftp nic.ddn.mil
Connected to nic.ddn.mil.
220-*****Welcome to the Network Information Center*****
*****Login with username "anonymous" and password "guest" *****You may change directories to
the following:
ddn-news              - DDN Management Bulletins
domain                - Root Domain Zone Files
ien                   - Internet Engineering Notes
iesg                  - IETF Steering Group
ietf                  - Internet Engineering Task Force
internet-drafts       - Internet Drafts
netinfo               - NIC Information Files
netprog               - Guest Software (ex. whois.c)
protocols             - TCP-IP & OSI Documents
rfc                   - RFC Repository
scc                   - DDN Security Bulletins
220 And more.
Name (nic.ddn.mil:herb):                    ☛ anonymous
331 Guest login ok, send "guest" as password.
Password:                                   ☛ guest
230 Guest login ok, access restrictions apply.
Remote system type is UNIX.
Using binary mode to transfer files.
ftp>                                        ☛ cd rfc
250 CWD command successful.
ftp>                                        ☛ type ascii
200 Type set to A.
ftp>                                        ☛ get rfc1325.txt
200 PORT command successful.
150 Opening ASCII mode data connection for rfc1325.txt (91885 bytes).
226 Transfer complete.
94240 bytes received in 8.5 seconds (11 Kbytes/s)
ftp>                                        ☛ quit
221 Goodbye.
```

If you are unfamiliar with UNIX or do not have access to a UNIX machine, and you are familiar with VM/CMS, you might want to study the accompanying article on BITFTP. This article discusses how to obtain the manual through VM/CMS.

If you have any questions, write to *herb@gpu.utcs.utoronto.ca* or *herb@vm.utcs.utoronto.ca*.

Introduction to FTP Under VM/CMS

We have received mail from various people (some of whom are University of Toronto researchers working at other academic institutions) asking how to obtain access to INTERNET documents when they either have no access to a UNIX machine or are unfamiliar with UNIX usage.

Getting Help for FTP

At the University of Toronto, VM/CMS users may access a File Transfer Protocol (FTP) package by issuing the following commands:

```
getme tcpip
help ftp
```

The 'help' provides information about a series of routines that will allow you to gain access to the INTERNET. You can successfully access the INTERNET by following the helps as documented.

Using BITNET FTP

For some of you, it may be easier to use the BITNET File Transfer Protocol Server at Princeton. To use this, begin by simply sending the following type of electronic mail message after you see the Ready prompt. Text that you are to type is preceded by a pointing hand.

```
☛ mail bitftp@pucc.princeton.edu
Your name (optional):                        ☛ HERB@vm.utcs.utoronto.ca
Name for bitftp (optional):                  ☛ bitftp@pucc.princeton.edu
Subject (optional):                          ☛ help
```

You will then see the following mail screen:

```
  >>> MAIL 89.02.0B <<< Sending Mail:  Enter your message below      Line 6 of 19
====>
Date:        Thu, 14 May 92 14:48:36 EDT
From:        Herb <HERB@vm.utcs.utoronto.ca>
Subject:       help
To:        "bitftp@pucc.princeton.edu"  <bitftp@pucc.princeton.edu>
=====================================================================
```

After you send the mail, you will receive (within a day or two) a help document explaining how to use the server. With the information in this document, you can then send FTP commands through electronic mail to the server to obtain the documents you want. Also, you can put the desired instructions in a file and use and change them as desired. As an example, let's obtain the "Zen and the Internet" documents defined in the accompanying article. We mail the following:

INTERNET NOTES

```
Date:  Fri, 15 May 92 15:16:28 EDT
From:  Herb <HERB@vm.utcs.utoronto.ca>
Subject:  get zen
To:  bitftp <bitftp@pucc.princeton.edu>

  >>> MAIL 89.02.0B <<< Sending Mail:  Enter your message below      Line 6 of 19
====>
Date:        Thu, 14 May 92 14:48:36 EDT
From:        Herb <HERB@vm.utcs.utoronto.ca>
Subject:       get zen
To:        "bitftp@pucc.princeton.edu"  <bitftp@pucc.princeton.edu>
====================================================================
FTP ftp.cs.widener.edu NETDATA             ☛ press <Tab>
USER anonymous                             ☛ press <Tab>
CD pub/zen                                 ☛ press <Tab>
ASCII                                      ☛ press <Tab>
GET README zen.readme                      ☛ press <Tab>
GET zen-1.0.PS zen.ps                      ☛ press <Tab>
QUIT                                       ☛ press <Return> or <Home>

====>                                      ☛ issue send command <PF5>
```

If you did this, you would receive back the following type of electronic mail:

```
Received: from PUCC.PRINCETON.EDU by VM.UTCS.UTORONTO.CA (Mailer R2.07) with BSMTP id 5111;
Fri, 15 May 92 15:20:30 EDT
Received: from PUCC.PRINCETON.EDU by PUCC.PRINCETON.EDU (Mailer R2.08 ptf016)
 with BSMTP id 3031; Fri, 15 May 92 15:19:48 EDT
Received: by PUCC (Mailer R2.08 ptf020) id 6098; Fri, 15 May 92 15:19:48 EDT Date:      Fri,
15 May 1992 15:19:47 EDT
From:      Princeton BITNET FTP Server <BITFTP2@PUCC>
To:        HERB@UTORVM
Subject:   BITFTP REPLY


15:17:13 > FTP ftp.cs.widener.edu NETDATA
15:17:13 > USER anonymous
15:17:13 >> OPEN FTP.CS.WIDENER.EDU
15:17:20 <<< 220-ftp.cs.widener.edu FTP server (Widener-4.0/wustl-bet a-6.0) ready.
             220 Report any problems to ftp-manager@cs.widener.edu.
15:17:21 >> USER anonymous HERB@UTORVM
15:17:22 >>> USER anonymous
15:17:22 <<< 331 Guest login ok, send e-mail address as password.
15:17:22 >>> PASS ********
15:17:22 <<< 230-Welcome to the Widener University Computer Science Department FTP Archive.
             230-
             230-If your ftp client chokes on this message, log in wi
             th a '-' as the
             230-first character of your password to disable it.
             230-
```

```
               230-If you have problems with or questions about this service, send mail to
               230-ftp-manager@cs.widener.edu; we'll try to fix the pro
               blem or answer the
               230-question.
               230-
               230-Current local time is Fri May 15 15:17:53 1992.
               230-
               230 Guest login ok, access restrictions apply.
15:17:22 > CD pub/zen
15:17:22 >> CD pub/zen
15:17:24 >>> CWD pub/zen
15:17:24 <<< 250-Please read the file README
              250-  it was last modified on Mon Apr 27 20:54:25 1992
                18 days ago
               250 CWD command successful.
15:17:24 > ASCII
15:17:24 >> ASCII
15:17:25 >>> TYPE a
15:17:25 <<< 200 Type set to A.
15:17:25 > GET README zen.readme
15:17:25 >> GET README ZEN.README.D ( REPLACE 15:17:27 >>> PORT 128,112,129,123,123,149
15:17:27 <<< 200 PORT command successful. 15:17:27 >>> RETR README
15:17:27 <<< 150 Opening ASCII mode data connection for README (4499 bytes).
15:17:27 <<< 226 Transfer complete.
15:17:33 >>>> File "README" sent to you as "ZEN README".
15:17:33 > GET zen-1.0.PS zen.ps
15:17:33 >> GET zen-1.0.PS ZEN.PS.D ( REPLACE
15:19:32 >>> PORT 128,112,129,123,123,150 15:19:32 <<< 200 PORT command successful. 15:19:32
>>> RETR zen-1.0.PS
15:19:32 <<< 150 Opening ASCII mode data connection for zen-1.0.PS (4 92528 bytes).
15:19:32 <<< 226 Transfer complete.
15:19:46 >>>> File "zen-1.0.PS" sent to you as "ZEN PS".
15:19:46 > QUIT
15:19:46 >> CLOSE
15:19:47 >>> QUIT
15:19:47 <<< 221 Ciao!
```

If you did this, you would also find two files in your VM reader, ZEN README and ZEN PS, which may be received as ordinary VM files. By this method, you can obtain access to INTERNET documentation without having to worry about having access to UNIX, but you still must understand the various commands associated with obtaining files from other machines in the INTERNET environment. It is important to note that in the example, ZEN PS is a PostScript file. You must not use the regular PRINT command, but must use the SENDPS command if you wish to print the file. On VM/CMS request HELP SENDPS for specific information.

If you have any questions about BITFTP, write to *herb@vm.utcs.utoronto.ca.*

"ZEN and the Art of the INTERNET"

"Zen and the Art of the INTERNET: A Beginner's Guide to the INTERNET" is a helpful, comprehensive booklet that is a good reference for beginning users. This article describes how to obtain and print the booklet.

> This is the first edition of a booklet entitled "Zen and the Art of the Internet: A Beginner's Guide to the Internet". It's roughly 100 pages in length, and is divided into the following sections:
>
> * Chapter 1—Network Basics
> * Chapter 2—Electronic Mail
> * Chapter 3—Anonymous FTP
> * Chapter 4—Usenet News
> * Chapter 5—Telnet
> * Chapter 6—Tools (finger/ping/etc)
> * Chapter 7—Commercial Uses of the Internet
> * Chapter 8—Things you'll hear about (projects/organizations)
> * Chapter 9—Finding Out More
> * An appendix on reaching other networks
> * An appendix on mail-based file retrieval (FTPmail, archive servers)
> * An appendix on how to create a newsgroup
> * A glossary of 80+ terms
> * A bibliography of over a dozen books and two dozen papers and magazines related to the Internet and similar topics.
>
> Why do you want this? Well, for one thing it's free. It's also unique—there presently exists no single comprehensive collection of the information directly related to being connected to the Internet. Most users learn by word of mouth and stumbling upon things. This guide should give you a reference to consult if you're curious about what can be done with the Internet. It also presents the fundamental topics that are all too often assumed and considered trivial by many network users. This is your first "virtual quickie."

What the author says about his book is perfectly true. The only difficulty is that it is not distributed in text (txt) format because it is going to be sold commercially. It is available primarily in PostScript (PS) format, so you must have access to a PostScript printer in most cases, though other printing formats are discussed in the associated README file.

To see the directory that contains the booklet and to obtain the booklet, follow the procedure below after you have logged in to your UNIX account. Text that you are to type is preceded by a pointing hand (☛).

```
gpu.utcs%                               ☛ ftp ftp.cs.widener.edu
Connected to ashley.cs.widener.edu.
220-ftp.cs.widener.edu FTP server (Widener-4.0/wustl-beta-6.0) ready.
220 Report any problems to ftp-manager@cs.widener.edu.
Name (ftp.cs.widener.edu:herb):         ☛ anonymous
331 Guest login ok, send e-mail address as password.
Password:                               ☛ herb@gpu.utcs.utoronto.ca          (Type your
230-Welcome to the Widener University Computer Science Department FTP Archive. e-mail address)
230-If you have problems with or questions about this service, send mail to
230-ftp-manager@cs.widener.edu; we'll try to fix the problem or answer the
230-question.
230-
```

```
230-Current local time is Fri May 15 15:00:43 1992.
230-
230 Guest login ok, access restrictions apply.
Remote system type is UNIX.
Using binary mode to transfer files.
ftp>                                      ☛ type ascii
200 Type set to A.
ftp>                                      ☛ cd pub/zen
250-Please read the file README
250-  it was last modified on Mon Apr 27 20:54:25 1992 - 18 days ago
250 CWD command successful.
ftp>                                      ☛ ls
200 PORT command successful.
150 Opening ASCII mode data connection for /bin/ls.
total 2458
-rw-r–r–   1 brendan  200          4499 Apr 28 00:54 README
-rw-r–r–   1 brendan  200        492528 Feb  6 04:33 zen-1.0.PS
-rw-r–r–   1 brendan  200        269504 Feb  6 04:33 zen-1.0.dvi
-rw-r–r–   1 brendan  200        454739 Feb  6 05:09 zen-1.0.tar.Z
226 Transfer complete.
ftp>                                      ☛ get README
200 PORT command successful.
150 Opening ASCII mode data connection for README (4499 bytes).
226 Transfer complete.
4587 bytes received in 1.3 seconds (3.4 Kbytes/s)
ftp>                                      ☛ get zen-1.0.PS
200 PORT command successful.
150 Opening ASCII mode data connection for zen-1.0.PS (492528 bytes).
226 Transfer complete.
499365 bytes received in 1.2e+02 seconds (4 Kbytes/s)
ftp>                                      ☛ quit
221 Ciao!
gpu.utcs%
```

Note, that in the previous dialog we listed a directory of the "foreign" machine and also obtained the README file mentioned in the list of files.

If you are using VM/CMS, we urge you to read in this issue the accompanying article on BITFTP; it will help you to obtain the booklet. Be especially careful in the printing of the file. If you print a PostScript file the wrong way you will waste a tremendous amount of paper.

Lastly, I would like to thank W. R. Cummins of Erindale College, who first told me about the booklet. If you know of any INTERNET publications or have information that might be of interest to others, let me know and I'll see what I can do to help spread the word. Send electronic mail to *herb@gpu.utcs.utoronto.ca*.

IMSL Product Licence Reminder

Andrzej Pindor
pindor@breeze.utcs.utoronto.ca

I would like to remind everyone that the University of Toronto site licence agreement with IMSL will expire September 3, 1992. Until this date you can purchase IMSL products (FORTRAN Library, C/Math Library and Exponent Graphics) at a very low price. After this date you will have to purchase these products directly from IMSL at the full price.

For information about purchasing IMSL products, call Andrzej Pindor at 978-5045.

IMSL FORTRAN Library Removed from CMS

As of July 7, 1992, the IMSL FORTRAN Library will no longer be available on CMS due to lack of use.

Distributed Computing and Load-Sharing

or How to Harness all Those Unused Cycles

Andrzej Pindor
pindor@breeze.utcs.utoronto.ca

Prices for UNIX workstations have come down dramatically in the last few years. At the same time, the computing power of these workstations has increased substantially. As a result, many researchers have acquired individual workstations and do most of their computations on their own machines. Since most of these machines are attached to high-speed local area networks (LANs), it becomes possible for a computational task originating at one workstation to be executed by another workstation on the network. This process is known as distributed computing. Distributed computing has many flavours, depending on the reasons for setting it up. Below I will concentrate on the load-sharing aspects of distributed computing, which aim at better use of computational resources in a research environment.

Note that we are not considering parallel processing here, but rather the distribution of standard, sequential processing jobs to various computers. High Performance Computing (HPC), another group in Computing and Communications, are investigating software which facilitates the sharing of the resources of multiple computers in a parallel process mode.

Consider the pattern of workstation usage in a research setting. For almost every machine there are periods when it is used very lightly, for example to prepare papers and to receive and send electronic mail. There are also periods of code development or interactive computation, when the usage is heavier, but still the machine may be idle for considerable periods of time. Finally, when heavy computations are being performed, the machine may be used 24 hours a day and a researcher may still find that he or she needs more computing power. People use their machines at varying levels of intensity at different times. Consequently, at times when some machines are used to their full capacity and their owners are desperate for more computing power, other machines may have a lot of unused cycles. These unused cycles represent a hidden resource which can be exploited to deliver substantial additional computing power into hands of researchers at very little additional cost.

As noted above, most research workstations are connected to a LAN. In principle, unused cycles on one workstation might be accessible from another. The purpose of the load-sharing software is to make use of the empty cycles in a way that will minimize the possible side effects of such use.

There are several problems which might arise when trying to exploit the unused cycles. Although the owner of a workstation that is used very lightly for short periods of time might not mind his or her machine being used to run other people's programs there would be certain conditions attached:

a) That he or she will not notice any deterioration of performance of the machine when using it;
b) That there will be minimal danger of foreign programs crashing the machine, wreaking havoc with the file system, or accessing the owner's private files.

There is also the issue of the overhead required for using load-sharing software. This may involve the administrative efforts required to set up and maintain the software, as well as the computing cycles used by the software to perform its tasks.

At UTCS we are in the process of testing a load-sharing software package known as **Condor**. Condor was written at the Computer Sciences Department at the University of Wisconsin. It is designed to execute long running "batch" jobs on workstations that would otherwise be idle. Condor performs automatic location and allocation of jobs to idle machines, and, after initiation, performs checkpointing and migration of processes as necessary. Users do not have to change their programs at all to run under Condor, although their programs do have to be linked to special libraries.

The overall Condor pool consists of a single machine running the central manager and a number of target machines. Jobs can be submitted from any machine and will execute on a machine which is available at the moment. The central manager automatically locates and releases target machines and manages the queue of jobs waiting for Condor resources.

Owners of the workstations in the Condor "pool" have full control over how Condor uses their machines. Whether or not a given machine registered in a Condor pool is ready to accept a job sent to it depends on two factors: the current average load level and the time elapsed since the last interactive entry (from either keyboard or mouse). The owner of a workstation participating in the Condor pool decides the threshold values of these factors for his or her machine so that Condor-run jobs will not cause any inconvenience. If a Condor job is running on a workstation when its owner wants to use it, touching any key or the mouse causes the job to be suspended and possibly migrated to another workstation if available and restarted from the latest checkpoint.

Condor performs all its tasks without any change to the UNIX kernel whatsoever, minimizing the administrative effort required to install and maintain it. A lot of effort has been spent to prevent the possible security hazards mentioned previously.

At present Condor supports the following architecture and operating system combinations:

IBM R6000 running AIX 3.1
DECstation 3100 running Ultrix 3.0+
DECstation 3100 running Ultrix 4.0+
Sun-3 running SunOS4.1
Sun-4 running SunOS4.1
Sequent Symmetry running Dynix
VAX running Ultrix 3.0+
HP 9000 running BSD4.3
Silicon Graphics 4D running IRIX 3.3.1+

A Condor pool may consist of machines of different types. Although you can execute jobs on remote machines, you must compile them on the local machine.

In a later issue, we will report our experiences with Condor. We expect that number of groups around the campus may be interested in using this package to make better use of the computational resources they have available.

Maple Corner

News for Maple Users at U of T

Andrzej Pindor
pindor@breeze.utcs.utoronto.ca

The Maple Technical Newsletter

I recently received a new issue of *The Maple Technical Newsletter* (#7, Spring 1992). It contains the following articles:

"Maple in Education", by Tony Scott, Richard Pavelle and Darren Redfern. This article illustrates Maple's capabilities as a teaching tool, presenting four educational examples in Physics and Chemistry.

"The D Operator and Algorithmic Differentiation", by Michael Monagan and J.S. Devitt. The aim of this article is to inform the readers and Maple users about the development of the D operator in Maple. Originally the D operator was introduced to address the distinction between total and partial derivatives. Presently the D operator is being extended to address the problem of algorithmic differentiation, i.e., differentiation of Maple procedures.

"Working with linalg", by Eugene Johnson. This article discusses new functionality added to linalg.

"A Problem in Phylogenetic Tree Building", by Gaston H. Gonnet. This article discusses application of Maple to the construction of phylogenetic trees, one of the problems in Molecular Biology.

"Using Phase Portraits to Understand Population Dynamics", by Daniel Schwalbe. This article explores how Maple V's numerical and graphical capabilities complement the well-known symbolic capabilities of Maple.

"The Billard Problem", by Walter Gander and Dominik Gruntz. This paper presents an interesting nonlinear equation originating from a geometrical problem. The authors show how algorithmic differentiation is useful, and how the problem can also be solved analytically using the Maple system.

"An Application of Maple to Chemical Kinetics", by Mark H. Holmes and Jonathan Bell. This article shows how Maple can be used to carry out routine chemical analysis, such as finding the conservation laws or steady states.

The Maple Share Library

The Maple share library has a number of interesting new programs. As explained in the last issue of *ComputerNews*, the latest contributions to the share library are available by anonymous File Transfer Protocol (FTP) from *daisy.uwaterloo.ca* (IP number is 129.97.140.58). If you have problems accessing anonymous FTP, please call us for help.

The latest contributions include:

classical

(file: linalg/classical)
Rational canonical form for a matrix of rational numbers. Includes a utility routine for constructing the hyper companion matrix of a univariate polynomial.
Eugene Johnson, *ejohnson@umaxc.weeg.uiowa.edu*

entermatrix

(file: linalg/entermatrix)
Utility routine for interactive matrix entry.
Michael Monagan, *monagan@inf.ethz.ch*

fit

(file: fit)
A (linear) least squares fit of a curve to a set of data.
Dominik Gruntz, *gruntz@inf.ethz.ch*

fourier

(file: fourier)
Symbolic Fourier transform — fourier(f(t),t,w) computes an analytic expression for the Fourier integral
F(w) = integrate(f(t)*exp(-I*t*w), t=-infinity..infinity)
George Labahn, *glabahn@daisy.waterloo.edu*

PD

(file: PD)
Algorithmic differentiation: given a function f of n variables input as a Maple procedure, PD(f,i,n) outputs a procedure that computes D[i$n](f) i.e. the n'th partial

derivative of f wrt the n'th parameter (optionally returns all the derivatives).
Michael Monagan, *monagan@inf.ethz.ch*

posets

(files: posets/posets, posets/help, posets/posets.tex)
A package of routines for manipulating partially ordered sets, including routines to enumerate all non-isomorphic Posets and Lattices on n vertices.
John Stenbridge, *jrs@math.mit.edu*

spline

(file: spline)
Piecewise polynomial interpolation of a list of data points. Also includes a representation for piecewise expressions and support routines for numerical evaluation and differentiation.
Michael Monagan, *monagan@inf.ethz.ch*

tex

(file: tex)
For generating LaTeX, plain TeX and AMS TeX output. Includes facilities for breaking up large expressions (for sums and products but not arrays or quotients).
Yunliang Yu, *yu@math.duke.edu*

surfdata

(file: plots/surfdata)
Given one or more grids of [x,y,z] points, plot the surface(s). The input is a list of lists of points where each point is a list of three constants, typically numerical. NB: the plot3d function in Maple only allows you to plot a surface given a function, not just data.
Michael Monagan, *monagan@inf.ethz.ch*

kinetics

(files: kinetics, kinetics.tex)
(routines: odes, laws, steady)
Given a reaction scheme these Maple procedures determine the system of differential equations, the associated conservation laws, and some of the species that have a zero steady state.
Mark Holmes, *holmem@rpi.edu*

algodiff

(files algodiff/GRADIENT, JACOBIAN, HESSIAN, TAYLOR, GRADIENT.tex)
A package of routines for algorithmic differentiation.

(routine: GRADIENT)
Given a function f(x1,...,xm) input as a Maple procedure the output of GRADIENT(f) is a Maple procedure that computes the gradient of f, i.e. the vector G where G[i] = diff(f(x1,...,xm),xi) for i=1..m

(routine: HESSIAN — needs GRADIENT to be loaded)
The output of HESSIAN(f) is a Maple procedure that computes the Hessian matrix H of partial derivatives where H[i,j] = diff(f(x1,...,xm),xi,xj)

(routine: TAYLOR — needs GRADIENT to be loaded)
The output of TAYLOR(f,[x1,...,xm],n) is a Maple procedure that computes the taylor series coefficients of f up to total degree n.

(routine: JACOBIAN — needs also GRADIENT to be loaded)
Given functions f[i](x1,...xm) for i = 1..n input as Maple procedures, the output of JACOBIAN([f[1],...,f[n]]) is a Maple procedure that computes the Jacobian matrix J where J[i,j] = diff(f[i](x1,...,xm),xj)

The GRADIENT, HESSIAN, TAYLOR, and JACOBIAN routines have various options that control output format (array or sequence). Maple input procedures can have local arrays and procedures, and can return more than one value as an array of arbitrary rank.
Walter Neuenschwander, *wneuensc@inf.ethz.ch*
Michael Monagan, *monagan@inf.ethz.ch*

xdvi

(file: xdvi) (this command runs under UNIX only)
Generate LaTeX output for a Maple expression and run it first through LaTeX and then run xdvi on the resulting .dvi file
Michael Monagan, *monagan@inf.ethz.ch*
For more information about Maple, call Andrzej Pindor at 978-5045.

UTCS Services

> *The mission of Computing and Communications (UTCC) is to provide services, facilities, and expertise that ensures that the University of Toronto is a leader in the cost-effective utilization, management and evolution of information technology in support of the research, teaching, library, and administrative goals of the University.*

Facilities Managed by UTCS

Administrative Computing
- administrative ORACLE, IMS, DB2, TS0, Batch
- 3081K processor, 48 megabytes of memory
- MVS/XA operating system

Computer Disciplines Facility/PC
- 88 NEC computers connected in a Local Area Network:
  - •Robarts Library (Rm. 1061A): 36 NEC PCs
  - •St. Michael's College (Rm. 107): 26 NEC PCs
  - •Sidney Smith (Rm. 1071): 23 NEC PCs
  - •Trinity College (Rm. 024): 3 NEC PCs
- MS-DOS with Turing environment
- introductory computer science

Computers in Quantitative and Empirical Science Teaching (CQUEST)
- 52 DEC VT1000 X Window terminals, 20 DEC 2100 workstations connected in Local Area Network:
  - •Ramsay Wright (Rm. 211, 213): 29 DEC VT1000s, 10 DEC 2100s
  - •Sidney Smith (Rm. 2105): 20 DEC VT1000s, 10 DEC 2100s
  - •Departmental use: 3 DEC VT1000s

Public Sites
- 50 XT100 terminals connected to PACX
  - •Robarts Library (Rm. 1061A): 24 terminals
  - •Engineering Annex (Rm. 107B): 12 terminals
  - •St. Michael's College (Rm. 107): 9 terminals
  - •Victoria College (1st floor): 3 terminals
  - •Trinity College (Rm. 024): 2 terminals

Erindale College Systems

SUN 3/280, 16 megabytes of memory
- instructional and research access using UNIX

VAX 8200, 8 megabytes of memory
- instructional access using VMS
- research access

UTCS Centrally Owned and Managed

Systems

IBM VM/CMS
Technical Assistance: 978-6602
- General Purpose Timesharing environment
- Hub of the NetNorth network with access to BITNET, EARN and the Internet
- 4381-R03 processor with 32 megabytes of memory
- CP operating system, VM/SP HPO R6
- CMS timesharing system, VM/SP Release 6
- FTP and TELNET access to the campus Ethernet, as well as Internet
- RSCS spooling system, Release 2.3

GP UNIX
Technical Assistance: 978-8853
- General Purpose Timesharing under SUN UNIX 4.1.1
- SUN 4/490, 32 megabytes of memory
- access to Linotronic typesetter
- full access to USENET, an electronic technical information exchange facility
- full access to the Internet, UUCPNET, BITNET, CDNNET

Services

Facility Management Support
Primary Phone: 978-5050
- Installs, maintains and upgrades microcomputer systems, particularly Macintoshes, IBM PCs and compatibles on a contract basis or on a cost-per-call basis.
- Provides institutional sales for approved personal computer equipment
- Provides management of computing facilities and local area networks for local office systems and undergraduate facilities

Network Development & Support
Primary Phone: 978-7087
- Communications Group provides communications systems, terminals, modems, data channels: consulting and installation.
- provides access between the IBM systems and machines using UNIX, VMS, and other operating systems. Ethernet, Pronet, and IBM TRN technologies are used over various transmission media including optical fibre. More basic communications techniques are also used for moderate speed links.
- provides consulting on local area networking
- provides access to NetNorth (BITNET), the North American Universities Network; ONET, the Ontario Regional Network; CA*net, the Canadian National Network; and USENET, the UNIX networking fraternity
- will provide a communications solution to department needs on a contractual basis

User Support Services
Advising and Consulting
Primary Phone: 978-HELP
- The Advising and Consulting group is available to University faculty, staff, and graduate students.
- provides phone-in advising, and consultations by appointment for the following products:
  - operating systems: DOS, Macintosh System & Finder
  - packages and libraries: SAS, SPSS, SYSTAT
  - word processors: WordPerfect, Microsoft Word
  - databases: dBASE IV, FoxBASE
  - spreadsheet: Lotus 1-2-3, Microsoft Excel
  - file transfer: ProComm, MacKermit
  - electronic mail: OuickMail

Information Technology Support
Primary Phone: 978-5601
- selection consulting for hardware and software
- Micro Lab for evaluation of hardware and software
- CD-ROM access to software and information discs
- offers phototypesetting service

Administration and Information Services
Primary Phone: 978-4462
- administers Local Area Network of PCs for Education Facility
- administers Macintosh Education Facility
- administers site licences for various software packages
- provides short courses and seminars on the more popular services and software packages
- provides accounting services for all UTCS services
- provides accounting services for the University's telephone system on behalf of the Voice Communications Department
- produces *ComputerNews*, the *Computing & Communications Newsletter*, and assists in the production of the UTCC Annual Report

Telephone Listings

Consulting and Enquiries

Account & Access Code Enquiries	Jason Pante	BC101B	978-7148
Communication, Networking & Hardware	Rosi Derka-Tseu	BC105	978-7087
Erindale College	Joe Lim	ER2035	828-5311
IBM & Macintosh Maintenance	Rosi Derka-Tseu	BC103	978-1299
Information Office / Site Licences	Evelyn Ward	BC201	978-4990
Tape Library (Academic Services)	Susan Kovago	MP368	978-7319
Tape Library (Administrative Services)	Miranda Fong	MP368	978-6693
UTCS Noncredit Short Courses	Irene Rosiecki	BC217	978-4565

Consulting & Advising Services:	978-HELP
CMS, and GP UNIX userids:	ADVISOR
CMS Userid for mail problems:	POSTMSTR
Network Operations Centre	978-4621
System Status Enquiries (GP UNIX)	978-4318
System Status Enquiries (IBM)	978-7393
Interactive Services 300 (bps)	978-3959
Interactive Services 1200 (bps)	978-395
Interactive Services 2400 (bps)	978-7239
Interactive Services 9600 (bps)	978-7220

UTCS Directory

Management Office General Enquiry			978-4462	
Director:	Dr. Warren Jackson	BC118	978-8948	wcj@vm.utcs.utoronto.ca
Associate Director, Operations:	Eugene Siciunas	BC116	978-5058	eugene@vm.utcs.utoronto.ca
Managers:				
Computer & Network Operations Support	Dr. Bob Chambers	MP350	978-7092	bob@utcs.utoronto.ca
Systems Support	Bill Lauriston	MP350	978-3579	bill@utcs.utoronto.ca
Facility Management Support	Vera Cabanus	BC312A	978-7107	vcabanus@gpu.utcs.utoronto.ca
User Support Services	Don Gibson	BC312	978-7331	gibson@utcs.utoronto.ca
Network Development & Support	Norman Housley	BC121B	978-4967	norman@vm.utcs.utoronto.ca
Administration & Information Services	Ron Vander Kraats	BC121A	978-4428	rvk@vm.utcs.utoronto.ca

Legend:
BC = Bancroft Building
ER = Erindale
MP = McLennan Physical Labs

* NetNorth/BITNET/EARN

Terminal & Advising Sites

Names and Locations

Central Advising Office (CAO), 978-HELP
Engineering Annex (EA), 11 King's College Road, Room 107B
Erindale College (Erin), 828-5339, 3359 Mississauga Road North, Erindale Campus, Rooms 2037, 2045
Ramsay Wright, 25 Harbord St., Rooms 211, 213
Robarts, Robarts Library, 130 St. George St., Room 1061A
Sidney Smith (Sidney), 100 St. George St., Room 1071, 2105
St. Michael's College, 121 St. Joseph St., Room 107
Trinity College, 6 Hoskin Ave., Room 024
Victoria University, 73 Queen's Park Cres., 1st floor

Access Hours

Sites	Hours of Access				Restrictions*	Advising
	Mon-Thurs	Fri	Sat	Sun		
CAO	12:00-18:00	12:00-18:00	closed	closed	Research	978-HELP
EA	24 hrs	24 hrs	24 hrs	24 hrs	None	978-HELP for Research
Erin (2045)	9:00-22:00	9:00-22:00	12:00-18:00	12:00-18:00	None	Rm 2005
Ramsay Wright	7:00-21:00	7:00-18:00	closed	closed	Undergrads	No
Robarts	8:30-24:00	8:30-24:00	9:00-22:00	13:00-22:00	None	978-HELP for Research
Sidney	7:00-24:00	7:00-24:00	7:00-24:00	7:00-24:00	None	978-HELP for Research
~~**St. Michael's**~~	~~24 hrs~~	~~24 hrs~~	~~24 hrs~~	~~24 hrs~~	~~None~~	~~978-HELP for Research~~
~~**Trinity**~~	~~8:00-22:00~~	~~8:00-22:00~~	~~8:00-22:00~~	~~8:00-22:00~~	~~None~~	~~978-HELP for Research~~
Victoria	8:30-21:00	8:30-21:00	8:00-13:00	8:00-13:00	None	978-HELP for Research

Sites	Advising Hours
CAO	Monday through Friday, 12:00 - 18:00
Erin	Monday through Friday, 09:00 - 22:00

Please note that the St. Michael's and Trinity College sites will be closed for the summer until after the Labour Day weekend.

* Research includes graduates, faculty, staff

Computer and Printer Access

Sites	PACX	CDF/PC	CQUEST	Printers
EA	Y			Y*
Erin	Y			Y*
Ramsay Wright			Y	Y**
Robarts	Y	Y		Y*
Sidney		Y	Y	Y**
St. Michael's	Y	Y		Y*
Trinity	Y	Y		
Victoria	Y			

(Y=yes, N=no)
* Public Printers **Site Only

UTCS administers a number of software site licences available to the University of Toronto community. (Usually, this means faculty, staff, and graduate students, though some licences apply to undergraduate students also. See "Restrictions" in the table below.) The licences provide a variety of software at much-reduced cost. The majority of the licences must be renewed each year. Most are terminated when you leave U of T.

Each licence has a contract that you must complete. It outlines your responsibilities and any limitations in the use of the software. All contracts and software are available from the UTCS Information Office, 4 Bancroft Avenue, Room 201. To qualify as a member of the U of T community, you must provide a valid Employee number or Student number.

The table below describes the available site licences. The Restrictions column specifies who may purchase the licence. If the restriction is Research, the payment must come from research money. The Diskettes/Distribution column describes how you actually receive the software. Large packages, like SAS and SPSS, require that you borrow the diskettes, install the software, and return the diskettes. Smaller packages, consisting of up to five diskettes, require you to bring your own diskettes.

For more detailed information about these site licences, telephone the UTCS Information Office at 978-4990.

Prices subject to change.

Site Licences at UTCS

Product/ Operating System	Cost	Restrictions	Licence Period	Diskettes/ Distribution	*
Chaos in the Classroom I: Maps and Bifurcations					
PC	$12.00	Faculty, Staff, Graduate Students	One-time fee	One 5.25" or one 3.5"; bring own	Yes
CSLG					
There are over 250 individual software products included in this package.	$250.00	Departments with Digital hardware	One-time fee	Call 978-4595.	No
C++					
UNIX V, Release 2.1 Language System	$42.00	Faculty, Staff, Research	One-time fee	To purchase: call Evelyn Ward at 978-4990. Technical questions: Paul Kern at 978-4696.	No

***Documentation available at UTCS**

Site Licences at UTCS *cont.*

Product/ Operating System	Cost	Restrictions	Licence Period	Diskettes/ Distribution	*
IMSL					
UNIX Class IVA machines; FORTRAN Subroutines		U of T-owned machines	One-time fee	Tape cartridge or network download	Yes
IMSL (MATH, STAT, SFUN):	$935.00				
Exponent Graphics:	$475.00				
C BASE Library:	$445.00				
Interactive Document Facility:	$140.00				
Environmental Install. & Assurance Tests:	$140.00				
Registration Fee:	$588.00				
IMSL					
UNIX Class IVB machines; FORTRAN Subroutines		U of T-owned machines	One-time fee	Tape cartridge or network download	Yes
IMSL (MATH, STAT, SFUN):	$565.00				
Exponent Graphics:	$285.00				
C BASE Library:	$265.00				
Interactive Document Facility:	$87.00				
Environmental Install. & Assurance Tests:	$87.00				
Registration Fee:	$588.00				
IMSL					
PC; FORTRAN Subroutines		U of T-owned machines	One-time fee	Deposit $100; borrow and return diskettes	Yes
IMSL (MATH, STAT, SFUN):	$195.00				
Maple (single machine or network server)					
DecStation 2100, 3100 (Ultrix)	$300.00	Staff	One-time fee	Borrow and return diskettes, tape cartridge; network download	Yes
DecStation 5000, 5100 (Ultrix)	$500.00				
DecStation 5400, 5800 (Ultrix)	$760.00				
HP 9000/300, HP 9000, 400 (HP-UX 7.0)	$300.00				
HP 9000/700, HP 9000, 800 (HP-UX 7.0)	$430.00				
SUN 3 (SUN OS 4.0)	$240.00				
SUN 4, SPARCstation (SUN OS 4.0)	$300.00				
SGI Personal IRIS (Irix)	$300.00				
SGI Professional IRIS 50-80GT (Irix)	$500.00				
SGI Professional IRIS 120-240GT (Irix)	$760.00				
PC-386 (DOS; UNIX)	$200.00				
MIPS, RC3230 (UNIX)	$300.00				
IBM RS6000 model 320 (AIX)	$300.00				
Macintosh (Finder)	$130.00				
Note: station cost is half the single machine price.					

Note: Only available until September 3, 1992.

***Documentation available at UTCS**

Site Licences at UTCS *cont.*

Product/ Operating System	Cost	Restrictions	Licence Period	Diskettes/ Distribution	*
Novell Netware 3.11 — 20-user Licence					
PC; LAN Server Licence: Upgrade Licence: Upgrade from Other Vendor's Software:	 $2506.00 $1392.00 $2088.00	University Departments	One-time fee	Deposit $50; borrow and return diskettes	Yes
Novell Netware 3.11 — 100-user Licence					
PC; LAN Server Licence: Upgrade Licence: Upgrade from Other Vendor's Software:	 $4873.00 $2088.00 $3480.00	University Departments	One-time fee	Deposit $50; borrow and return diskettes	Yes
Other Novell Products					
Mac Netware 3.0: Novell Netware NFS	$438.00 $1392.00	University Departments	One-time fee	Deposit $50; borrow and return diskettes	Yes
ProComm					
PC; Communications Note: Documentation on disk; part of package	Free	Faculty, Staff, Graduate Students, Undergraduate	N/A	Two 5.25"; bring own	Yes
QuickMail					
Mac; Electronic mail Per user: Upgrades:	 $35.00 $17.00	Faculty, Staff	One-time fee	One 3.5"; bring own	No

***Documentation available at UTCS**

Site Licences at UTCS *cont.*

Product/ Operating System	Cost	Restrictions	Licence Period	Diskettes/ Distribution	*
SAS/PC					
PC; Statistical analysis BASE/STAT/GRAPH/FSP: IML module: ETS module:	 $35.00 $31.00 $31.00	Faculty, Staff, Graduate Students, Undergraduate	July 1- June 30	Deposit per binder (Maximum $100); borrow and return diskettes	Yes
SAS/PC network					
PC; Statistical analysis Per station: IML, ETS modules each per station	 $17.00 $16.00	Faculty, Staff, Graduate Students	July 1- June 30	Deposit per binder (Maximum $100); borrow and return diskettes	Yes
SAS/UNIX (Sun-3 & Sun-4)					
UNIX; Statistical analysis Sun-3, Sun-4/1xxx and Sun-4/2xxx (all modules): Sun-4/330:	 $388.00 $776.00	Faculty, Staff, Graduate Students	July 1- June 30	Tape cartridge	Yes
SAS/UNIX (Sun-3 & Sun-4) Network					
UNIX; Statistical analysis Per server* (all modules): *Each server counts as 10 workunits regardless of the number of stations being served.	 $3880.00	Faculty, Staff, Graduate Students	July 1- June 30	Tape cartridge	Yes
SPSS/PC					
PC; Statistical analysis Full Package: Data Entry Module Only:	 $40.00 $20.00	Research	Nov 1- Oct 31	Deposit max. $50; borrow and return diskettes	No
SPSS/PC network					
PC; Statistical analysis Full Package: Data Entry Module Only:	 $20.00 per station, plus server $10.00 per station, plus server	Research	Nov 1- Oct 31	Deposit max. $50; borrow and return diskettes	No

***Documentation available at UTCS**

Site Licences at UTCS
cont.

Product/ Operating System	Cost	Restrictions	Licence Period	Diskettes/ Distribution	*
SYSTAT version 5.X					
Mac 5.2; DOS 5.0; Statistical analysis	$80.00	Faculty, Staff, Graduate Students	July 1- June 30	Six 800KB 3.5" diskettes; bring own	Yes
SYSTAT network version 5.1					
Mac; Statistical analysis Price per station, plus server:	$40.00	Faculty, Staff, Graduate Students	July 1- June 30	Six 800KB 3.5" diskettes; bring own	Yes
UNIX V, Release 4					
Operating System	$18.00	Faculty, Staff, Research	One-time fee	*Send electronic mail to molnar@ gpu.utcs. utoronto.ca*	No
WATFOR-77					
PC; FORTRAN compiler [$35 WATFOR-87 (math co-processor)] GKS (Graphics Kernal System)	$35.00 Add $5.00	Research	July 1- June 30	Two-three 5.25" diskettes; bring own	Yes
WordPerfect (individual & networked machines)					
PC; WordProcessing New, per machine: Upgrade, per machine:	$42.00 $15.00	Faculty, Staff	One-time fee	Deposit $25; borrow and return diskettes	Yes

***Documentation available at UTCS**

PC Maintenance

Below is a listing of some microcomputer equipment which UTCS Micro Sales & Maintenance covers under yearly maintenance contracts. All contracts are based on a minimum 12 month period. Service calls are handled on a first-priority basis. Average response time is four hours. Equipment must be certified as operational prior to commencement of a maintenance contract. (There is no extra charge for this service.) Please contact UTCS Micro Sales & Maintenance at 978-5050 or 978-1299 to obtain service and pricing information.

IBM PC or Compatible Equipment

Systems
IBM PC PS/2 systems or compatibles
386, 486 systems
Notebooks
Laptops

Disk Drives
360KB & 1.2MB 5.25-inch Floppy
720KB & 1.4MB 3.5-inch Floppy

Hard Disk Drives
20 to 320 Megabyte

Displays
Monochrome
CGA / EGA / VGA Colour
PS/2 Monochrome/Colour
Most monitors

Modems
1200 & 2400 baud

Laser Printers
HP LaserJet
HP LaserJet II
PS Jet +
QMS PS 800
QMS PS 800+
QMS 810

Dot Matrix Printers
C-ITOH
Epson
IBM
NEC
Panasonic
Roland
Toshiba
Most makes

Apple Macintosh Equipment

Systems
Mac 128, 512, Plus
Mac Classic - All Models
Mac LC - All Models
Mac SE - All Models
Mac SE/30 - All Models
Mac II, IIx, IIcx, IIci, IIsi, IIfx
PowerBooks
Quadras

Disk Drives
400KB, 800KB 3.5-inch Floppy
1.4MB 3.5-inch Floppy

Hard Disk Drives
20 to 320 Megabyte

Displays
Apple Mac 12-inch Monochrome
Apple Mac 12-inch RGB
Apple High-Res 12-inch Monochrome
Apple High-Res 13-inch Colour

Modems
1200 & 2400 baud

Laser Printers
Personal LaserWriter LS
Personal LaserWriter NT
LaserWriter
LaserWriter Plus
LaserWriter IINT
LaserWriter IINTX

Dot Matrix Printers
ImageWriter I
ImageWriter II
ImageWriter II/L
Apple StyleWriter

UTCS also supplies and installs floppy disk drives, hard disk drives, video and other boards, math coprocessors, and memory upgrades.

Support for UNIX

We support timesharing on GP UNIX under Sun OS 4.1.1.

Support for VM/CMS

We support CMS release 6.0 under CP/HPO releave 6.0 For CMS support, call Supervisor Ted Sikorski at 978-6602.

Support by UTCS Advising

The following are microcomputer software packages supported by the UTCS Advising and Consulting Group. This service is available to University of Toronto faculty, staff, and graduate students. For assistance with the products listed below, call 978-HELP, Monday through Friday, between 12:00 noon and 6:00 p.m.

Package/Compiler	Version	Environment
Communications		
File Transfer & Terminal Emulators		
MacKermit	0.9(64)	Macintosh
ProComm	TU 2.4.2	MS-DOS
Database Managers		
dBASE IV	1.1	MS-DOS
FoxBASE Mac	2.01	Macintosh
Electronic Mail		
QuickMail	2.2.3	Macintosh
Operating Systems		
IBM PC & Compatibles		
Microsoft MS-DOS (incl. IBM PC-DOS)	5.0	n/a
Macintosh		
Finder	6.0.X	n/a
MultiFinder	6.0.X	n/a
System	6.0.X	n/a
Spreadsheet & Charting		
Lotus 1-2-3	2.02	MS-DOS
Microsoft Excel	2.2a, 3.0	Macintosh
Statistical		
SAS/PC	6.04	MS-DOS
SPSS/PC+	4.0	MS-DOS
SYSTAT	5.1	Macintosh
SAS	5.18, 6.07*	VM/CMS
SPSS^x	3.1, 4.1	VM/CMS
SAS	6.03, 6.07	UNIX, Sun3, Sun4
Word Processing		
Microsoft Word	4.0	Macintosh
WordPerfect	5.1	MS-DOS

*Fall 1992

ComputerNews
Subscription Request Form

If you wish to have your name and/or address added to, changed or deleted from our *ComputerNews* mailing list, please complete this form.

☐ **Add**
☐ **Change**
☐ **Delete my Name and Address**

Current
Name, ***Address*** and ***Postal Code,*** in full

____
____
____
____
____
____

Previous
Name and ***Address***, in full (or attach your old mailing label)

____
____
____
____
____
____

Check if you can receive *ComputerNews* by:
☐ Campus Mail
☐ IUTS
☐ HPI

Comments
on this issue of ComputerNews

____
____
____
____
____

Fold here
↓

Return address:

____

____

____

____

____

To:

ComputerNews
University of Toronto Computing Services
4 Bancroft Avenue, Room 217
Toronto, Ontario
M5S 1C1

↑
Fold here

UNIVERSITY OF TORONTO
COMPUTING SERVICES
TORONTO, CANADA
M5S 1A1